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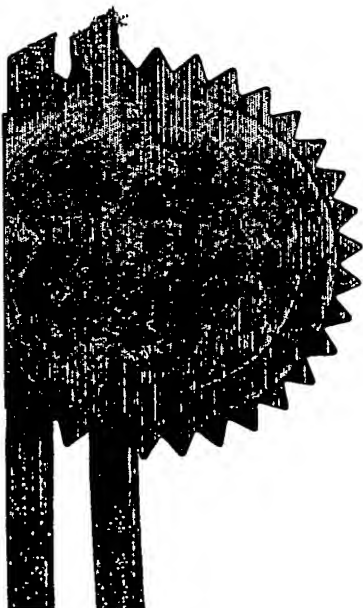
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2. Patent application number (The Patent Office will fill in this part)	TO BE ADVISED <sup>03 AUG 2002</sup> 0218076.8		
3. Full name, address and postcode of the or of each applicant (underline all surnames)	KINGSTON, JOHN EDWARD 49 ALLESTREE DRIVE SCARTH GRIMSBY LINCS DN33 3DX UNITED KINGDOM		
04259644002 Patents ADP number (if you know it)			
If the applicant is a corporate body, give the country/state of its incorporation			
4. Title of the invention	ALARM SYSTEM		
5. Name of your agent (if you have one)	URQUHART-DYKES & LORD NEW PRIESTGATE HOUSE 57 PRIESTGATE PETERBOROUGH CAMBRIDGESHIRE PE1 1JX UNITED KINGDOM		
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if: a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))	NO		

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Description

25

Claim(s)

9

Abstract

1

Drawing(s)

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

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Request for substantive examination (*Patents Form 10/77*)

Any other documents  
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11.

I/We request the grant of a patent on the basis of this application.

Signature

*Urquhart-Dykes & Lord*  
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Date

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12. Name and daytime telephone number of person to contact in the United Kingdom

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## ALARM SYSTEM

The present invention relates to an alarm system, an alarm signalling device and a method of transmitting and receiving alarm signals from a user, particularly but not exclusively to an alarm system adapted to receive distress signals from a user.

Document WO 91/15989 discloses a portable alarm device which is worn on the person, and which comprises an emergency button for triggering an internal transmitter to transmit an identification signal and a alarm signal. The transmitted signal is picked up by a base station comprising a receiver which provides a signal to a signalling device which sends out an audible and/or visual warning signal.

This device has the disadvantage that the user is unaware as to whether help actions are undertaken in response to the user's alarm signals. This increases the anxiety of the user who uses this system if no help arrives immediately.

Also, the user may not be physically capable of activating the alarm signalling device. In that case, this system is inadequate and the person may get further distressed as a result of this.

Portable telephones or mobile phones have also been used as an alarm device. However, mobile phones are too bulky and heavy to be carried around all day in and around the house, particularly when the phone is carried on the body of the user. Also, the device must be switched on continuously. This is not feasible as the battery cannot power the phone for prolonged periods because of the power consumption of the phone. Finally, a mobile phone is

expensive to operate and reception of the mobile phone signal is not always reliable.

It is therefore desirable to provide an improved alarm system, an alarm signalling device and a method of receiving alarm signals from a user, which enable more adequate provision of alarm signals, thereby addressing the above described problems; and/or which offers improvements generally.

In embodiments of the present invention, there are provided an alarm system, an alarm signalling device and a method of receiving alarm signals from a user as defined in any of the accompanying claims.

In an embodiment of the invention, there is provided an alarm signalling device comprising a user activatable transceiver means for transmitting an alarm signal to a responder device, the transceiver means being adapted to receive a response signal from the responder device in response to the alarm signal, and the alarm signalling device further comprising a user display means to display the response signal to the user. The transceiver means are activated by the user by pressing an activator such as a panic button. This activates the transceiver which transmits the emergency signal to the responder device. Upon receipt of the alarm signal, the responder device transmits a response signal to the transceiver. This signal is displayed to the user.

In an embodiment, the alarm signalling device may be small and/or lightweight and/or portable and it may be worn on the user's body, for example on the wrist (similar to a watch) or around the neck.

In another embodiment, the alarm signalling device may comprise interface means for receiving user data, said transceiver means being adapted to transmit the user data to the responder device after receipt of the response signal.

5 The user data may comprise the user's voice which is received by the interface means. The responder may comprise alarm signalling means which transmit the user's voice to aid services. The responder may also be adapted to dial aid services and the user may communicate with the aid services  
10 via the interface means. The interface face means comprise a microphone. The interface means may also comprise a speaker. Alternatively, the responder device may comprise a speaker.

15 In a further embodiment of the invention there is provided an alarm signalling device comprising means for informing the user of the activation of the alarm signal and/or subsequent actions by a responder device.

20 In yet another embodiment of the invention, the alarm signalling device may comprise means for controlling the transceiver in response to the user health data. The alarm signalling device may comprise storage means for storing user health records, the control means may control the  
25 transceiver on the basis of abnormalities or deviations of the user health data from the user health records which indicate ill health or a physical emergency of the user. The control means may comprise assessment means for assessing the user health deviations from the user health records.

30

In another embodiment of the invention there is provided an alarm system comprising a responder device for receiving an alarm signal from an alarm signalling device, the responder device comprising means for signalling an  
35 alarm, the alarm signalling device comprising interface

means for receiving user information and activator means for activating transmission of the alarm signal in response to the user information.

5        In an embodiment of the invention there is provided an alarm system comprising a transceiver device for transmitting an alarm signal and a responder device for receiving the alarm signal, the responder device comprising means for signalling an alarm, the transceiver device  
10 comprising interface means for receiving user information and activating means for activating transmission of the alarm signal in response to the user information, the transceiver device further comprising means for receiving a response signal from the responder device, the transceiver  
15 device comprising representation means for representing the response signal.

      The system may comprise one or more transceiver devices. Each transceiver device may transmit an alarm  
20 signal which comprises an identification signal. The responder device may comprise identification means for identifying the transceiver from the identification signal.

      In another embodiment of the invention, the transceiver  
25 means may comprise a signal channel selection means for selecting the transmission frequency or transmission channel for transmitting the alarm signal. The transceiver means may receive a channel control signal from the responder for controlling the signal channel selection means. This  
30 arrangement allows the transceiver to change its transmission frequency if the transmission quality for a particular frequency is poor for example due to interference. Another important advantage is that multiple alarm signalling devices may be used with a single responder  
35 device. The channel selection means then automatically

provide a suitable transmission channel for each alarm signalling device which does not interfere with the transmissions of the other alarm signalling devices. This obviates the need for changing transmission settings on the alarm signalling device and/or responder device if additional alarm signalling devices and/or responder devices are provided.

In an embodiment of the invention, the interface means may comprise a button or switch for receiving the user's distress or alarm notification. The interface means may also comprise voice receiving means for receiving the user's voice instructions. The interface means may also be adapted to interface with one or more sensors for sensing the physical condition of the user. These sensing devices may comprise blood pressure sensors, temperature sensors, heart rate sensors or any other suitable monitoring devices for sensing medical conditions.

In a preferred embodiment, the responder device may be connectable to a telephone line. The responder device may be adapted to dial one or more emergency numbers. The responder device may further comprise dialling means for dialling one or more emergency numbers. The dialling means may dial a first telephone number and if no connection is made to the first number, the dialling means dial a further number. The dialling means may comprise a telephone number storage means. In addition to dialling a telephone number, alternative alarm signals may be provided. In this way the appropriate emergency services or relatives may be contacted or alternative actions may be taken such as the sounding of an alarm.

In another embodiment of the invention, the alarm system may comprise a distance monitoring means or range



monitoring means for monitoring the distance between the responder device and the alarm signalling device. If the distance monitoring means detects that the alarm signalling device is approaching the maximum allowable distance, the user may be informed of this. The responder device may also comprise a range monitoring means. The range monitoring means may monitor the distance between the responder device and the alarm signalling device. The range monitoring means may also monitor the signal strength of the transmitted signal of the alarm signalling device at the responder device or vice versa. If the signal is too weak, the range monitoring means may inform the user that the alarm signalling device is out of range.

15 In another embodiment, the alarm system may comprise operation verification means for verifying operation of the system. The operation verifying means may comprise self-diagnostic checks. These checks may comprise a sequence whereby the alarm signalling device is activated, and the responder device provides a response signal and a diagnostic alarm signal is provided to a responder monitoring station.

25 The system may further comprise a power management system for managing the power output of the signalling transceiver and/or responder device depending on the distance between the device and the base station so as to ensure optimum transmission of signals at a lowest possible power level.

30 In an embodiment, the transceiver device may comprise display means for representing the response signal from the responder device. The display means may comprise a visual display means and/or an audible display means signal and/or a tactile display means.

The transceiver device may comprise control means for controlling the activating means in response to the user health data. The system may comprise storage means for storing user health records, the control means controlling the activating means if the health data are not in keep with the user health records. For example, if user's health data deviates from the data stored in the health records, as a result of an abnormality in the physical condition of the user, then the alarm signalling device is activated.

In yet another embodiment, the alarm system may comprise identification means for identifying individual alarm signalling devices. The system may further comprise storage means for storing alarm signalling procedures for each alarm signalling device. The alarm signalling means may be configured to signal the alarm by following the alarm signalling procedure for a particular alarm signalling device. The procedure may define the types of alarm to be signalled and/or the sequence of the alarms and/or including telephone numbers to be dialled. For example, if a particular alarm signalling device is activated, according the alarm procedure which corresponds to the alarm signalling device, the external audible alarm could be activated, an emergency number could be dialled and if there is no response a subsequent number could be dialled. In this way, for each individual user of an alarm signalling device the appropriate alarm procedure is conducted. The alarm procedures may be entered into the system by means of a suitable responder interface such as a link via a computer.

In another embodiment, the system may comprise a means for monitoring the distance between the transceiver device and the responder device to prevent the transceiver device from being too far removed from the responder device. The monitoring means may be adapted to activate the display

means. The system may further comprise locating means for storing the position of the transceiver device in the responder so that the alarm signalling device can be conveniently located.

5

There is thus provided an alarm system and an alarm signalling device and a method for receiving alarm signals.

10 In an embodiment of the invention there is provided an alarm system generally, and in particular a personal alarm system for indicating when a user requires assistance, as well as having the facility for monitoring and sending other medical or security or other relevant data to a responder or aid services.

15

The user wears or has within his/her possession a personal alarm signalling device, that can be totally waterproof and intrinsically safe and that houses a transceiver, which communicates with a responder device such as a telephone console or base station which also houses a transceiver. The transceiver may comprise AM (amplitude modulation), FM (Frequency Modulation), in all its forms, Phase Modulation, in all its forms or broad spectrum or 'Bluetooth' technology. The transceiver may be a single channel or multi-channel radio frequency device. The responder device and the alarm signalling device may also comprise a digital transmission method.

30 In an embodiment, the alarm signalling device may comprise interface means which are adapted to receive speech from a user. The speech may be digitised and then converted from a digital speech signal to an analogue speech signal either by the responder device or by the signalling device. The responder device may communicate with a monitoring station or end user down a hard wired or wireless telephone

35

line or via other transmission methods for example a modem.

The alarm signalling device may be configured at the point of manufacture, or have the facility via switches or other means located internally or externally to be, 'permanently on', or in a 'sleep mode' or remain in the off position, or a combination of all three, until either the panic button(s) or 'range finder' as described below are pressed. For example in the on and/or sleep mode, the alarm signalling device could check with the telephone console/base station for any incoming messages (at fixed or varied times) or from incoming callers and/or instructions from the monitoring station, or allow the monitoring station to communicate with the alarm signalling device.

The alarm system operates within a frequency band that is licence exempt, within those licence exempt guidelines laid down by individual countries. When activated, by means of pressing one or multiple button(s)/sensor(s) or other switching devices, on the alarm signalling device or by voice activation, dependent on the manufacturer, the alarm signal device sends a coded/ encoded/identification signal to a base station/telephone console, which then starts to dial the programmable telephones numbers to a monitoring station or end user, (whilst at all times communicating with the alarm signalling device such that the user is aware of the sequence of events). The means of activating the alarm signalling device may be dependent on the manufacturer.

The alarm signalling device may have the following options to inform the user that the alarm signalling device has been activated. The alarm signalling device may comprise one or more user attention actions comprising (a) vibration and/or as well as have a (b) LED, LCD (Liquid Crystal display), Plasma or similar screen which enables

data/pictures/video or text to be made visual, which would also benefit the hard of hearing or the deaf, and/or (c) an audible signal which would also sound for a set time, and/or (d) a pre-recorded voice message which informs the user that the user has activated the signalling device, and/or (e) LED(s) (light emitting diodes) mounted within the alarm signalling device(s) housing or panic button(s). Once the user activates the alarm signalling device, the display means may display any of the user attention actions. For example, when the alarm signalling device is activated the LED(s) and/or panic button(s) could colour red. The buttons could also be a fixed or a flashing LED could inform the user that the signal is being transmitted to the base station and could change to a fixed red (not flashing) or different colour LED(s) once a connection has been made either to the base station/ monitoring station or end user.

Once the base station/telephone console has received the correct identification code from the alarm signalling device, the telephone console/base station automatically dials the preset/programmable telephone numbers in sequence as entered by either the user or on behalf of the user, and will then send a signal back to the alarm signalling device, either before the system started dialling the telephone numbers or after, which in turn via any of the above options (a-e) would inform the user that they now have piece of mind that the base station will be ringing the appropriate telephone number(s) such as a monitoring station/emergency services, doctor or friend etc. For example the housing, LED(s) and /or panic button(s) could go a fixed colour, for example orange or a flashing LED to indicate this.

Once the telephone connection has been made, the alarm signalling device in turn, via any of the above options (a-e), informs the user that the user can now speak into the

microphone housed within the Alarm signalling device, or microphone located within the telephone console/base station and/ or repeaters. For example the housing and/or panic button(s) or Led(s) could now go a fixed colour for example  
5 Green or a flashing LED to indicate this. Either or all of the above options (a-e) can be integrated within the system to alert the user that they have activated the alarm signalling device, for a fixed or varied time and/or to alert the user where they are 'sequence wise', during this  
10 transmission/connection period, following through to the disconnection period.

To ensure efficient identification of the alarm signalling device, the encoded or identification signal is  
15 repeated numerous times. The encoded or identification signal may be programmed into the system at the point of manufacture or programmed via the user which can be either a fixed code or a rolling code or other coding system designated by the manufacturer. The code could also be set  
20 internally on the alarm signalling device via miniature switches or links which are provided on the printed circuit board, or via a miniature keypad. The other means of allowing the user to programme the code is by using the telephone console/base station by means explained above  
25 which could then be transmitted to the alarm signalling device, or by other means designated by the manufacturer. All data transmitted between both the alarm signalling devices and base station/ telephone console to the end user monitoring station could be encrypted with an encryption  
30 programme(s) depending on the customers requirements if total secure data encrypted protection is required.

In another embodiment of the invention, the alarm system may comprise signal channel selection means for  
35 selecting the transmission frequency or transmission channel

for transmitting the alarm signal. This arrangement allows the system to change its transmission frequency if the transmission quality for a particular frequency is poor for example due to interference.

5

A microphone is fitted as standard within the alarm signalling device with a speaker to enable two way conversation to take place with the monitoring station/emergency services/end user. The speaker may be located within the base station/telephone console with additional hard wired or wireless slave speaker(s) located within the building and outside of the building (if required i.e. for a system that is adapted to function outside a building). Either or all of the above attention actions (a-e) can be integrated within the system for a fixed or varied time to alert the user when the alarm signalling device is activated, and/or to alert the user of the actions taken by the responder device during the transmission/connection period, following through to the disconnection period, which gives the user piece of mind that they can actually see and hear the events unfold. The volume for the speaker(s) located within the base station/telephone console and/or slave speaker(s) could be fixed or adjusted manually/automatically by either slider control sensor button(s) or by using voice commands (voice activated) or by using any of the button(s) which are used to initiate an alarm call once the alarm has been activated. Alternatively, the volume could be controlled manually or automatically by the monitoring station or similar end user. The volume level control could be indicated using above option (b) or by audio message via a speaker housed within the telephone console/base station or via additional hard wired or wireless speaker(s) strategically placed within and around the user's property.

35

A speaker along with the microphone which would be standard and housed within the alarm signalling device or associated strap, with the above user attention actions, to allow a true two way conversation with for example the monitoring station, emergency services, doctor or designated end users. This gives the user greater independence. This gives the user piece of mind that they can actually see and hear the events unfold. The volume for the speaker housed within the alarm signalling device could be fixed or adjusted manually/automatically by either slider control sensor(s) / button(s) or by using voice commands (voice activated) or by using any of the button(s) which are used to initiate an alarm call once the alarm has been activated. Or the volume can be controlled manually or automatically by the monitoring station or similar end user. The volume level control could be indicated using option (b) or by audio message via the speaker housed within the alarm signalling device or via a speaker located within the base station /telephone console and/or to indicate volume level.

The range finder enables the user to verify that the alarm signalling device is in range with the responder device at the press of a button. The alarm signalling device may also have the function that it allows the user to answer incoming calls. This allows the user to answer telephone calls from a remote location. The user could speak to callers via the alarm signalling device and the caller could be heard from a loudspeaker which may be provided on the responder device.

In another embodiment there is provided an alarm signalling device which does not house a microphone or speaker, but which has one or more user attention actions as discussed above, with the microphone and speaker within the telephone console/base station and/ or hard wired or



wireless slave speakers and separate or combined repeater units/housing the speakers, to allow two way conversation to take place. The repeater units give the system a greater range. The slave speakers and/ or repeaters could also house  
5 the microphone. If required, to again allow two way conversation to take place. Either/or all of the above user attention actions (a-e) can be integrated within the system for a fixed or varied time to alert the user that they have activated the alarm signalling device, and/ or to alert the  
10 user where they are 'sequence wise', during this transmission/connection period, following through to the disconnection period. This gives the user piece of mind that they can actually see and hear the events unfold.

15 The alarm signalling devices may bypass the base station/ telephone console and link directly to the telephone network by using bluetooth technology and/or by using mobile wireless telephony technology/satellite communications either to a landline/cable or mobile  
20 telephone network and operate throughout the designated countries similar to a mobile telephone, linking the user to a monitoring station or predetermined telephone number set. A number of preset numbers could be programmed into the alarm trigger by either the user or monitoring  
25 station/operator/manufacturer, and they could be programmed via speech recognition, by keypad on the alarm trigger, or externally via a telephone console or some other external means. Either/or all of the above options (a-e) may be integrated within the system for a fixed or varied time to  
30 alert the user that they have activated the alarm signalling device, and/or to alert the user where they are 'sequence wise', during this transmission/connection period, following through to the disconnection period. This gives the user piece of mind that they can actually see and hear the events  
35 unfold.

The alarm signalling devices or transceivers as hereinbefore described may also have the facility of a 'range finder' facility. Such that by pressing a button(s) on the alarm signalling device the button(s) could illuminate or an led or other function as described in options (a-e) may inform the user that they have pressed the 'range finder' button, and that the transceiver has sent a coded signal to the telephone console/base station. On receipt of that coded signal, a coded signal is sent back to the user's alarm signalling device, which then either illuminates another LED and/or the original LED changes to another colour, for a period of time set by the manufacturer. The user may also be informed by other means such as via the speaker(s) in the base station or speaker(s) in the alarm signalling device, or hard wired or wireless slave speakers (which in turn inform the user that they are within range).

In addition, a recorded message or audio signal, or someone speaking into the microphone on the telephone console/base station, could be incorporated into the system. The range finder gives the user peace of mind that at any time they can check whether they are in range of the telephone console/base station if they needed to press the panic button(s). The LED, LCD/plasma or similar screen on the alarm signalling device could also give information/data, such as a battery level indicator, and data regarding the range, which then could be downloaded with other relevant information if required to the monitoring station or end user if required, as and when, via the user or, on command from the monitoring station / end-user at preset or variable times, or when the panic button is activated. If the user was out of range then the alarm signalling device would not receive a coded signal back. If the telephone console/base station did not receive the coded

signal from the alarm signalling device or if the telephone console base station has received the coded signal from activating the range finder on the alarm signalling device this could be indicated on the telephone console/base station which could then give a visual or audible indication. Either way the user is aware whether he is in range or not and the user could perform a check on the system.

10       The alarm signalling devices as described hereinbefore may comprise a LED (light emitting diode), LCD (liquid crystal display) or plasma screen or similar screen to allow communication with a monitoring station either with video picture/data or text so that the user can see someone whom  
15       they are communicating with, and/or the ability to communicate with the user with text such that the system can be used for the hard of hearing or the deaf, and will be able to interface with peripherals such as doorbells, telephones, smoke detectors, alarm systems and other  
20       domestic systems that can alert a deaf person, so long as those devices have a transmitter/transceiver operating on the same frequency and own identity code, for means of identifying that unit.

25       The alarm signalling device could be programmed to operate efficiently by means of carrying out self diagnostic checks either when the alarm signalling device is activated or at preset times or on request, from the monitoring station or end user along with information on the battery  
30       status. Whilst the alarm signalling device is in operation, this information is of vital importance such that if the battery status reaches a level where it requires recharging or a replacement battery, then the alarm trigger informs the monitoring station either when the batteries are low or  
35       before the batteries are too low, either automatically or

manually by activation of the alarm signalling device. As well as indicating on the alarm trigger itself by means of an LED or audible/voice speech signal, the user may be alerted to this by means of one or multiple user attention actions.

The transceivers in both the alarm signalling device(s) and telephone console base station can be programmed to operate at a fixed power output dependent on the manufacturer but not exceeding that stated by the DTI Radio Communications Agency and other relevant bodies/regulations. However the transceivers may be programmed with a power management system so that they can continually monitor both the power out and the power received such as to then alter the power output such that it operates efficiently to conserve battery power. The monitoring station/end-user could also (if required) have the ability to increase or decrease the power output if required. The power output level could be indicated on the Alarm trigger via LED(s), or via information such as a graph or other means of measurement which could then be displayed on the screen.

The alarm signalling device could have the option to incorporate GPS (global positioning system) or similar global wireless positioning equipment/software, which on activation of the alarm trigger and relevant GPS/wireless positioning equipment and associated software, allow a monitoring station to be able to locate the user anywhere in the world which is most advantageous with all the alarm signalling devices but more advantageous with the system. The system may also act as a means of keeping an eye on criminals/patients, and those who are on probation.

The alarm signalling device may be designed to be housed such that it can take the form of a watch to be worn on the

wrist such that the user can use a watch strap, be it leather, plastic, metallic, elasticated, or other material, and/or other means of securing the alarm signalling device to the user. The housing may be designed and manufactured so  
5 that it may take on various connections and/ or add ons so that it could be carried as a pager or can be worn as a pendant, on a belt key fob or attached to the user's clothing by safety pin(s), spring clip or more secure means. The alarm signalling devices may also house a watch such as  
10 a digital watch along with additional facilities found with such a product or a conventional analogue watch which may be battery operated or mechanical (wind up).

The panic button(s) located on the alarm signalling  
15 device may be slightly recessed or may have a protective rim if required to prevent accidental activation or have a protective cover covering the front of the alarm signalling device.

20 The antenna for the alarm signalling device(s) may be designed such that it is housed internally imprinted onto the PCB (printed circuit Board) or using a surface mount antenna which again could be incorporated onto the PCB or connected to the transceiver via wire, cable or other  
25 connection means but situated within the alarm signalling device, or by incorporating the antenna be it wire or other radiating material within the housing or strap or any of the above external to the housing / strap.

30 The alarm signalling device(s) may be powered from internal/external rechargeable batteries which could be recharged by conventional means or by placing the signalling device into an independent charging unit or into a recharging unit which is part of the telephone console/base  
35 station via suitable electrical contacts provided on the

signalling device and the charger located on or within the telephone console/base station or independent charging unit. The alarm signalling device may also be powered by non-rechargeable battery(s) if required.

5

With the system having the facility to transmit data then the system interfaces with medical monitoring equipment /sensors which can be built into the alarm activating device so as to transmit various medical/environmental information such as blood pressure/heart rate temperature etc to the monitoring/medical centre, via the base station/telephone console. The alarm signalling devices may be designed so as to remain permanently on, or to operate in sleep mode or to be only activated when the panic button(s) is activated. The system is designed such that it may be interfaced with both domestic and commercial security alarm systems, and associated peripherals such as passive infra-red devices, pull cords, smoke detectors, cameras etc, and medical monitoring equipment and other ancillary equipment such that relevant data from these systems/accessories can also be sent either manually or automatically via the base station /telephone console to a dedicated number or monitoring station programmed by either the user installer/manufacturer or end user. The system is also designed such that if the alarm system detects an intruder/fire and initiates a call, and the user activates the alarm signalling device then this takes priority and hence open a link with a dedicated telephone number or the monitoring station to allow the person wearing the alarm signalling device to be heard, yet whilst at the same time having the facility if required, to allow the monitoring station to carry on monitoring and controlling the data from the security alarm system and/or medical monitoring or other ancillary equipment.

35

The telephone console/base station may house a transceiver which will be able to communicate back and forth with the user's alarm signalling device which also houses a transceiver as described hereinbefore and can be designed for use either with telephone console or without an integrated telephone console base station to provide an easy to use low cost home alarm unit.

The system may be adapted for connection to the user's existing telephone line and may be adapted to raise an alarm call by either pressing a panic button(s) (which could be illuminated) on the telephone console/base station unit itself or by pressing the panic button(s) on the alarm signalling device. In either case the user will be reassured that their call is being processed by both visual and audible indications. The system could also allow the user to answer the telephone by pressing either the panic button(s) on the telephone console base unit or by pressing the panic button(s) or separate button on the alarm signalling device.

Pressing the panic button on the telephone console/base station automatically dials the designated monitoring station or other preset numbers such as that of a friend or relative. The base station can also contain a powerful speaker, and a sensitive microphone which would be a necessity if the alarm signalling device as explained hereinbefore which does not house a microphone within the alarm signalling device, were to be used. If the user's telephone is in use when an alarm is raised, then the current call is cancelled, to ensure that the alarm call initiated by the alarm signalling device or via the panic button on the responder device or on the telephone console/base station has priority. The telephone console base station also has the facility to detect if the end user has an answer machine switched on when it makes the call or

the end user is already using the phone giving an engaged signal and will then go onto the next telephone number and so on, and then repeat the sequence until somebody answers the telephone from one of the programmed telephone numbers.

5

The base station would also house a standby battery in case of mains failure, and could be programmed such that if there was a mains failure then the telephone console/base station could dial the monitoring station or other preset number informing them so.

10

The responder device or telephone base station may have numerous functions and the station may comprise the following features such as

15

a) the base station may be a standalone device that can interface with a user's existing telephone and connect to an existing telephone line,

20

b) the base station may be an integral telephone console which carries out the normal functions of a normal telephone unit,

c) numerous alarm signalling devices may be used within the system,

d) the system may enable high quality two way speech.

25

e) two or more data i/p ports may be programmed to dial separate telephone numbers, for example if the first port was interfaced with an alarm system, or technology in health (medical monitoring equipment) and the second port was interfaced with a gas meter, and/or any other piece of equipment from which, at preset or varied times and with the user's permission, companies could download data and other information).

30

f) the station may comprise several fast dial memory keys

g) large buttons to make location and dialling easy.

35

h) an LCD/plasma or similar screen which can present



various information/data as well as video and text. (This is particularly advantageous to users who are hard of hearing or deaf, and is also an audible and visual confirmation of an alarm call),

- 5        i)    cancel button
- j)    re-dial feature
- k)    hands free facility
- l)    inductive coupler in handset for use with hearing aids.
- 10       m)    number of emergency numbers that can be programmed into the system which depend ultimately on the manufacturer.
- n)    tone dialling for faster dialling.
- o)    adjustable pre-alarm delay.
- p)    monitoring of personal alarm battery status.
- 15       q)    automatic alert of power failure at monitoring station.
- r)    recall button for use with PABX and BT star services.
- s)    video camera.
- 20       t)    e-mail facilities.
- u)    programming, arming, resetting and test facility, and any other features which the manufacturer deems appropriate in this specialist field.

25       Once the call has been made via the responder device such as the telephone console or base station and the users call has been answered and the appropriate help given, the alarm signalling device(s) could be switched off or returned to sleep mode or back to its original state by either a

30       button(s) on the alarm signalling device, or more securely, the monitoring station could send a signal to the alarm signalling device via the telephone console/base station or directly to the alarm signalling device, shutting it down, or returning it to its original state, but before the alarm

35       signalling device shuts down or returns to its original

state, relevant data from the alarm signalling device could be sent to the monitoring station/end user if requested, and then finished by sending a signal back to the monitoring station informing them that it is now shutting down, or  
5 returning to its original state. The alarm signalling device could also be reset by the user or end-user by pressing via a telephone keypad on the end user's phone or the user's home phone key pad, a number of digits (which would be a code known only to those people concerned or involved with  
10 the system for security reasons) and the alarm signalling device could also shut down (same as with the monitoring station).

The alarm signalling device could also be reset by  
15 means of pins /connections or key switch via the telephone base station/telephone base station or other integral unit which could be used to carry out the above function as well as for programming the system. The alarm signalling devices may also communicate with a hand held wireless console that  
20 could be of use for example in large nursing/residential homes or similar establishments which would allow the end user to be more mobile yet always be in contact with his residents, if the panic button(s) was activated.

25 The invention will now be described by way of example only and with reference to the accompanying illustrative drawings in which:

Figure 1 is a diagrammatic view of an alarm signalling device according to an embodiment of the invention; and  
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Figure 2 is a diagrammatic view of a responder device according to another embodiment of the invention.

The alarm signalling device 41 comprises a user  
35 activatable transceiver (not shown) for transmitting an

alarm signal to a responder device (not shown). The transceiver is activated by the user by means of an emergency button 2. The transceiver is adapted to receive a response signal from the responder device in response to the alarm signal. The alarm signalling device 41 further comprises a user display means in the form of an indicator light 10 to display the response signal to the user. The device 41 also comprises an interface means in the form of a microphone 3 for receiving the user's voice. The transceiver is adapted to transmit the user's voice to the responder device after receipt of the response signal.

The alarm device 41 comprises a durable plastics housing 1 with a strap 9 which allows the device 41 to be worn on any part of the body. Preferably, the device is worn on the wrist like a watch. A display 5 is provided to display the time. Buttons 7 and 8 are provided to make adjustments to the setup and/or operation of the alarm signalling device 41.

The responder device 21 comprises a visual alarm 32 which is activated when an alarm signal is received. The device further comprises a telephone dialling system for contacting emergency services and/or telephone services. A telephone connection 34 with the device enables these services to be contacted. The responder device has a loudspeaker (not shown) to enable the user to hear the emergency services via the telephone. A display 31 shows the operation of the responder device. Button 30 allows the system to return to its initial monitoring state when an alarm has been raised.

The responder device 21 may be mounted in a convenient location inside the building, powered either directly from the mains or from a socket S, with the back-up of

recargeable batteries in the event of mains power failure. The responder device transmits a response signal to the alarm signalling device 41 and starts the help procedure which comprises the step of dialling emergency services via telephone connection 34.

5

In use, the device 41 is worn on the body. If help is required by the user, the button 2 is pressed to activate the transceiver. Upon receipt of the alarm signal from the device 41, the responder transmits a response signal and the responder conducts its help procedure which may comprise contacting the relevant emergency services and/or providing an alarm. The device receives the response signal and displays the signal with light 10 so that the user is aware that the responder has activated its help procedure. The responder device 21 activates the attention light 32 and contacts the emergency services. The user then communicates with the services via the microphone 3 on the device 41. After the user has been helped, the system is returned to its operational monitoring state by pressing the reset button 30.

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## CLAIMS

1. An alarm signalling device comprising a user  
5       activatable transceiver means for transmitting an alarm  
signal to a responder device, wherein the transceiver  
means is adapted to receive a response signal from the  
responder device in response to the alarm signal, and  
the alarm signalling device further comprises a user  
10       display means to display the response signal to the  
user.
2. An alarm signalling device according to claim 1,  
wherein the signalling device comprises interface means  
for receiving user data, said transceiver means being  
15       adapted to transmit the user data to the responder  
device after receipt of the response signal.
3. An alarm signalling device according to claim 2,  
wherein the interface means comprises a microphone.  
20
4. An alarm signalling device according to claim 2 or 3,  
wherein the user data comprise the user's voice and/or  
data relating to the user's physical condition.
- 25   5. An alarm system according to any of claims 2 to 4,  
wherein the interface means are adapted to receive user  
health data.
- 30   6. An alarm system according to claim 5, wherein the  
transceiver means are adapted to transmit user health  
data to the responder device.
- 35   7. An alarm signalling device according to any of claims  
1 to 6, wherein the transceiver means comprises signal  
channel selection means for selecting the frequency or

channel for transmitting the alarm signal.

8. An alarm signalling device according to claim 7,  
wherein the transceiver means is adapted to receive a  
5 channel control signal from the responder for  
controlling the signal channel selection means.
9. An alarm signalling device according to any of the  
preceding claims, wherein the user display means  
10 comprises a visual display means and/or an audible  
display means signal and/or a tactile display means.
10. An alarm signalling device according to any of the  
preceding claims, wherein the device comprises a range  
15 monitoring means for monitoring the range between the  
alarm signalling device and the responder device.
11. An alarm signalling device according to claim 10,  
wherein the range monitoring are adapted to activate  
20 the user display means if the signalling device is out  
of range of the responder device.
12. An alarm signalling device according to claim 11,  
wherein the range monitoring means are activatable by  
25 the user.
13. An alarm signalling device according to any of the  
preceding claims, wherein the transceiver means is  
adapted to transmit an identification code to identify  
30 the alarm signalling device from multiple alarm  
signalling devices.
14. An alarm signalling device comprising means for  
informing the user of the activation of the alarm  
35 signal and/or subsequent actions by a responder device.

15. An alarm signalling device comprising a transceiver for transmitting an alarm signal, interface means for receiving user data and activator means for activating the transceiver to transmit the alarm signal in response to the user information, wherein the transceiver device further comprises means for receiving a response signal from a responder device, the alarm signalling device comprising user display means for representing the response signal to the user.
16. An alarm system comprising an alarm signalling device according to any of the preceding claims.
17. An alarm system comprising a responder device for receiving an alarm signal from an alarm signalling device according to any of claims 1 to 16, the responder device comprising means for signalling an alarm.
18. An alarm system according to claim 17 or 16, wherein the alarm signalling means comprises a visual alarm and/or audible alarm.
19. An alarm system according to any of claims 16 to 18, wherein the alarm signalling means comprises telephone dialling means for contacting emergency services and/or telephone services.
20. An alarm system according to any of claims 16 to 19, wherein the alarm signalling device comprises signal channel selection means for selecting the frequency or channel for transmitting the alarm signal and the responder device comprises responder channel selection means for selecting the channel for receiving the alarm

signal.

21. An alarm system according to claim 20, wherein the responder device transmits a selection signal for  
5 controlling the signal channel selection means.
22. An alarm system according to claim 21, wherein the responder device controls the signal channel selection means in response to a reduced signal quality and/or  
10 interference on the selected channel.
23. An alarm system according to any of claims 21 or 22, wherein the responder channel selection means continuously or periodically transmits a selection  
15 signal for monitoring the quality of the transmission channel or frequency.
24. An alarm system according to any of claims 16 to 23, wherein the responder device comprises a speaker to  
20 represent the telephone connection.
25. An alarm system according to any of claims 16 to 24, wherein the responder device comprises telephone answering means for enabling the user to answer the  
25 calls via the alarm signalling device.
26. An alarm system according to any of claims 16 to 25, wherein the system may comprise means for monitoring the range between the transceiver device and the  
30 responder device to prevent the transceiver device from being out of range.
27. An alarm system according to any of claims 16 to 26, wherein the system comprises identification means for  
35 identifying an alarm signalling device.



28. An alarm system according to claim 27, wherein the system comprises one or more responder devices and one or more alarm signalling devices, the responder device signalling an alarm which corresponds to the identified alarm signalling device.
29. An alarm system according to any of claims 27 or 28, wherein the system comprises a storage means for storing an alarm procedure for each alarm signalling device, the alarm signalling means signalling an alarm in accordance with the alarm procedure for the identified alarm signalling device.
30. An alarm system according to any of claims 16 to 29, wherein system may comprise locating means for locating the position of the alarm signalling device.
31. An alarm system according to any of claims 16 to 30, wherein the system comprises storage means for storing user health records, the system further comprising means for monitoring the health of the user, the health monitoring means activating the transceiver if the user health data activator control means controlling the activating means on the basis of abnormalities of the user health data from the user health records.
32. An alarm system according to any of claims 16 to 31, wherein the responder device is adapted to be monitored by responder monitoring means.
33. An alarm system according to any of claims 16 to 32, wherein the response signal comprises data relating to the alarm signalling means to inform the user of the operation of the alarm signalling means.

34. An alarm system comprising a responder device for receiving an alarm signal from a transceiver device, the responder device comprising means for signalling an alarm, the transceiver means comprising interface means for receiving user information and activating means for activating transmission of the alarm signal in response to the user information, the transceiver device further comprising control means for controlling the activating means in response to the user health data.

35. An alarm system according to any of claims 16 to 34, wherein the responder device is adapted to receive incoming telephone calls and the alarm signalling device is adapted to answer the call via the interface means.

36. A method of receiving an alarm signal from an alarm signalling device according to any of claims 1 to 15 by means of an alarm system according to any of claims 16 to 35.

37. A method of receiving an alarm signal from a user comprising the steps of:  
providing an alarm system comprising a responder device for receiving an alarm signal from an alarm signalling device, the responder device comprising means for signalling an alarm, the alarm signalling device comprising a user activatable transceiver means for transmitting an alarm signal to a responder device, wherein the transceiver means is adapted to receive a response signal from the responder device in response to the alarm signal, and the alarm signalling device further comprises a user display means to display the response signal to the user,  
the method further comprising the steps of

the responder transmitting the alarm signal in response to the activated signalling device, and the user display means representing receipt of the alarm signal by the responder device.

5

38. A method according to claim 36 or 37, wherein the responder device is adapted to contact emergency services and/or persons.

10

39. A method according to any of claims 36 to 38, wherein the signalling device comprises interface means for receiving user data, the transceiver means being adapted to transmit the user data to the responder device after receipt of the response signal.

15

40. A method according to any of claims 36 to 39, wherein the user data comprise voice data and/or user health data.

20

41. A method according to any of claims 36 to 40, wherein the responder means comprises dialling means for dialling emergency services.

25

42. A method according to any of claims 36 to 41, wherein the dialling means are adapted to continue dialling until an emergency service is contacted.

30

43. A method according to any of claims 36 to 42, wherein the user communicates with the emergency service via the interface means.

35

44. A method according to any of claims 36 to 43, wherein the transceiver means comprise signal channel selection means for selecting the frequency or channel for transmitting the alarm signal and the responder device

comprises responder channel selection means for selecting the channel for receiving the alarm signal, the responder device controlling the signal channel selection means in response to a reduced signal quality and/or interference on the selected channel, the method comprising the step of selecting a different channel if the transmission quality is reduced.

45. A method according to any of claims 36 to 44, wherein the responder device continuously or periodically transmits a selection signal to monitor the transmission quality of the transmission channel or transmission frequency.

46. A method of receiving an alarm signal from a user comprising the steps of providing an alarm system comprising:

a responder device for receiving an alarm signal from one or more alarm signalling devices,

identification means for identifying each alarm signalling device,

a storage means for storing an alarm procedure for each alarm signalling device,

alarm signalling means for signalling an alarm in accordance with each alarm procedure,

the method further comprising the steps of receiving an alarm signal,

identifying the alarm signalling device, and

signalling an alarm in accordance with the alarm procedure corresponding to the alarm signalling device.

47. A method according to claim 46, wherein the alarm signalling means comprises telephone dialling means for contacting one or more emergency services and/or telephone services in accordance with the alarm

procedure.

## ABSTRACT

An alarm system comprising an alarm signalling device comprising a transceiver for transmitting an alarm signal.

- 5 The system comprises a responder device for receiving the alarm signal, the responder device comprising means for signalling an alarm. The alarm signalling device comprises interface means for receiving user information and activating means for activating the transceiver to transmit
- 10 the alarm signal in response to the user information. The transceiver device further comprises means for receiving a response signal from the responder device.

Fig. 1

